

ADDITIONAL LETTERS
OF
A PHYSICIAN
ON THE QUALITY OF THE
ST MARY'S LOCH WATER.

BY

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CHIRURGICAL SOCIETY, OF EDINBURGH; CONSULTING PHYSICIAN OF ROYAL HOSPITAL
FOR SICK CHILDREN OF EDINBURGH; CORRESPONDING FELLOW OF LONDON
MEDICAL SOCIETY; OF IMPERIAL AND ROYAL SOCIETY OF PHYSICIANS
OF VIENNA; OF SOCIETY OF SWEDISH PHYSICIANS OF STOCK-
HOLM; NORWEGIAN MEDICAL SOCIETY OF CHRISTIANIA;
ETC. ETC.

Reprinted, by request, from the Scotsman.

Ego pœnitere tanti non emo.—*Aulus Gellius.*

EDINBURGH:
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12 HANOVER STREET.

1871.

THE LIFE OF

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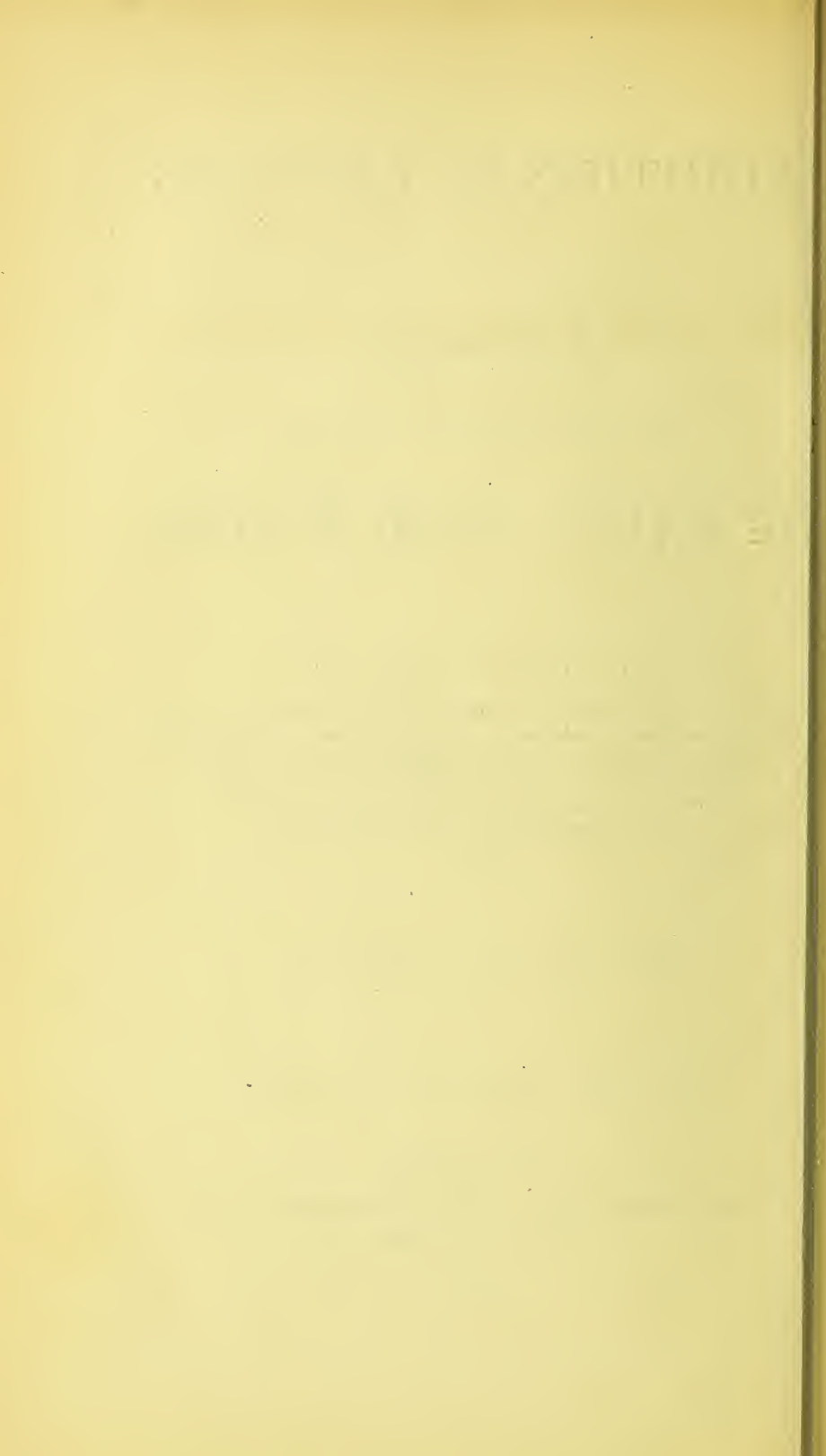
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ADDITIONAL LETTERS

ON THE

QUALITY OF ST MARY'S LOCH WATER.

LETTER VIII.

(From the Scotsman of May 6, 1871.)

Edinburgh, May 5, 1871.

SIR,—All who take an interest in the vital question which is now agitating the city, and especially those who have honoured the letters of "A Physician" with some portion of their confidence, doubtless solely on the score of the numerous facts and high authorities which he has brought into testimony throughout the series, must have had their attention arrested, if not their surprise excited, by a part of the medical evidence which has just been led before the Parliamentary Committee. One witness is reported to have stated, that "whoever the gentleman signing himself 'A Physician' may be, he has no knowledge of medicine, and I will give my reasons for this statement. He says that rickets, the essence of which is softening of the bones, may be produced by the absence of lime in the water drunk by a person suffering from the disease; but those who know anything about the matter are aware that the lime is actually in excess; and that, instead of going to the formation of bone, it is excreted by the kidney, and goes to the bladder." I have no wish to cavil at the kind of irrelation, generally, that is apparent in this statement. It is sufficient for me, as the writer of the letters, that it asserts that the essence of rickets consists in a softening of the bones, and that lime in the disease is actually in excess; and that not to know, or to assent, to this one portion of knowledge of the theory of a single disease is so complete a criterion that it implies the want of knowledge of all medicine besides. The rule in the latter clause of the sentence is not one which I should myself have laid down as either just or logical, whatever may be said of its peculiar courtesy: but, if it be a rule, we shall see afterwards in what direction it applies.

When, on Friday last, I first became aware of this statement, it was without the slightest inclination to bestow upon it a moment's notice. So soon as I saw, however, in the paper of last Tuesday, that the doctrines laid down had not only the assent of Dr Douglas Maclagan, but that still another charge was added to them; and that this accumulating evidence, so peremptorily advanced, had succeeded apparently in shaking, even in the counsel for the rate-

payers' opposition, that confidence in the letters with which they seemed previously to honour them, I could no longer regard the matter with the indifference with which I should have continued to view it had it remained merely personal to myself. The letters, I was aware, had received the approval of many; and they had been republished, neither at my instance nor at my expense, by those who hoped with me that they might prove instrumental in averting from the city a calamity that was likely to be ever afterwards regretted, and with the more poignancy that it could admit of no future remedy. Hence my communication in your paper of yesterday, and hence the letter now addressed to you.

It may be remembered that throughout the letters of "A Physician," I professed the design to found my remarks upon authority such as I acknowledged, and desired to be regarded, as "above my own." The authorities on which I now wish my few additional comments on the essence of rickets, and its relations to lime, to rest, will be mainly taken from each of our three great centres of medical science—Germany, France, and Britain. Virchow, the pre-eminent pathologist, I can scarcely avoid selecting to represent the first; Trousseau, one of the most distinguished of practical physicians, will represent almost equally worthily the second; and Sir William Jenner, the esteemed physician to the Queen, and to the Royal Hospital for Sick Children in London, the third. For Virchow's opinions, with those of his colleagues, Vogel, and more especially Stiebel, I quote from their great work on Special Pathology and Therapeutics; but confining myself, of course, to such passages as relate closely to the present topic. In rickets, then, it is stated (B. I., p. 535) that a perfect ossification does not take place. There is a retardation in the deposit of lime. The possibility is admitted (p. 539) that the disease may arise from either a defective supply of lime, with a re-absorption of that already deposited; or from the lime introduced into the system being maintained in too soluble a state through an excess of phosphoric or lactic acid, so that it fails to be deposited in the bone, and, remaining in the blood, is carried off by the kidney. Nourishment with merely cow's milk (p. 540), without water containing lime, gives liability to the disease. Potatoes, porridge, and food, with excess of starch, not only on theoretical grounds, but from old experience, are (p. 542) to be avoided. In acute rickets, the first indication of cure is (p. 543) the fixation or neutralization of the excess of acid, in order to obviate the great solubility of the lime, and to allay the abnormal irritation of the gastric coats. The second indication is the regulation of the perverted activity of the mucous membrane of the stomach and its nerves. For the first indication, lime is to be preferred to all other antacids, because it at the same time increases the mass of the materials necessary for the bone-earth; the carbonate of lime, in its various forms, and lime-water, maintaining, according to the most extensive experience, the superiority over the phosphate. For the second indication, aloes dissolved in lime-water has been found

beneficial. In chronic rickets, the child should be weaned if the nursing have been too long continued, and a water (p. 544) containing lime, with coffee of acorns and animal food, substituted. There is nothing, then, in all this, let it be observed, of an excess of lime in the system, but very much of its fresh introduction : and yet, in the mere prevention of the disease, regarding which alone I spoke, one grain might effect more than a hundred afterwards when the disease was fully established ; for prevention is always vastly easier than cure.

For the opinions of Trousseau, I refer to the valuable treatise on Therapeutics by himself and Pidoux. Phosphate of lime, given internally, is, according to these authorities (T. I., p. 442), endowed with the same properties as the carbonate. Mourriès, described as "one of our most distinguished chemists," is stated to consider that the alimentation of the inhabitants of cities is greatly deficient in phosphate of lime, even to the extent of a half, and that hence the milk of nurses does not contain a sufficient quantity. To this deficiency he attributes a large proportion of the still-born, with much of the mortality among the children in large towns ; and, among other disorders, he ascribes to it rickets, deformity of bones, and retarded dentition. Admitting (p. 443) that the phosphate of lime treatment has not hitherto "realised completely" the apparently so rational expectations formed regarding it, Trousseau and his colleague are eager to add that the question deserves to be resumed, and further trials instituted. They proceed to state that they have been in the habit of adding to the milk given to infants a portion of saccharine solution of lime, with beneficial dietetic results ; and possibly we may connect with this a statement by Ewich, a very judicious author on Mineral Waters (p. 97), for which, however, he gives no direct reference, that for rickets Trousseau prescribes milk with saccharate of lime. Ewich makes also the remark that, owing to the insolubility and difficulty of assimilation of the calcareous salts in the form of medicine, the waters naturally holding them in solution deserve special consideration. Turning now to the high authority of Sir William Jenner, we find that (*Lectures in Medical Times and Gazette*, 1860, p. 467), without being dogmatical on any description of theory, he recommends in the treatment of rickets, in its early stage, milk diluted with a fourth of lime-water, even to the extent of two or three meals during the day. At a more advanced period, he again recommends lime-water with milk, or with beef-tea substituted for part of the milk. What can Sir William Jenner mean by administering lime in rickets, if he knows that there is already an excess of it in the system ? Or, if he is not aware of this, let me whisperingly ask if he is prepared for the declaration of the alternative (and I trust the Queen will not hear of it) that he has no knowledge of medicine ? It might possibly prove some solace, in such an event, to know that Hufeland, for long a prince in medicine in Germany, recommends, in his *Enchiridion Medicum* (p. 372) earthy matters (*terrea*) in rickets as especially beneficial ; or that

Clarus, quoted in the *Materia Medica* of Dr Stillé (I. 361), declares the utility of lime-water in the disease, maintaining that it directly furnishes the deficient element; or that the venerable Professor Bang of Copenhagen, who seems, in his ripe years, to join the active spirit of inquiry of youth to the experience of extreme age, advises spring water (*kildevand*) in his "Handbook of Therapeutics" (pp. 89, 94), in the hygienic treatment both of scrofula and rickets. For my own part, knowing also what I have quoted to a similar purport before, I venture to think that the new test for medical knowledge fails here in its application: and thus I leave it to the public to determine on what side it is that the ignorance on this subject of rickets really lies.

As to my alleged mistranslations from the French, I have had two letters from Dr Maclagan on the subject, but by no means with any due approach to a satisfactory result. In your paper of May 2, he is reported to have thus spoken in his evidence: "when I came to look at the quotations from French authors in the letters of 'A Physician,' I found sentences of French so mistranslated that I could not understand them to have emanated from Dr Charles Wilson." In the *Courant* of the same day, the report is nearly identical, with the exception that the charge seems to be aggravated by the sentences being designated as "simple." The accuracy of these reports has not yet been questioned. The charge, perfect in its distinctness, and certainly not fitted to enhance my credit, was uttered in a public place, on an occasion of grave interest, and with time beforehand for ample consideration. The sentences could not be more simple than my request regarding them. I desire to know, not only what these sentences are, but in what work, and what portion of a work, Dr Maclagan has met with their supposed originals so as to ascertain that they were mistranslated, how they have been mistranslated, and how they ought to have been translated. If he allege errors, it is for him to specify them. He has no title to apply for any help in this from me, nor can I understand how it should be needed, unless he be first willing to confess that he had never seen the supposed sentences in the original, and had assailed me at random. The charge has been made by him, and on him alone rests the burden of its substantiation.

And now I have some little novelty to add regarding the vermin in the loch water. Those whose own indifference to nastiness induces them to compel others to gulp it against their will, are bold in their declarations that fleas, and the infinitely smaller animalcules that must necessarily be associated with them as their prey, are perfectly harmless, and by no means singularly unpleasant, when swallowed. Conclusions of this kind are maintained all the more absolutely that they are reached easily, and with little expenditure of research or thought. It came to my memory the other day, that my late friend, Professor Retzius, of Stockholm, had sent me many years ago a tiny pamphlet by Professor Malmsten, of the same city, detailing cases of animalcules occurring in man; and after some search I succeeded in

recovering it. The present interest in the subject of water may excuse the quality of some of its details. The cases are two in number, both occurring in 1856. The first was that of a man thirty-eight years old, in whose dejections, after a diarrhoea of some standing, in which the food was passed little altered by digestion, the animalcules were discovered in innumerable quantities, and so continued while the patient was under observation in the hospital. The second case was of a woman thirty-five years old, in whom, after long-continued diarrhoea, the same kind of animalcules as in the former case were discovered in the same way, lively, and in great numbers. At last, the patient died exhausted. The animalcules, of which a representation is given, were roundish oval, 1-10th of a millimetre in length, beset with cilia, and brisk in their motions, but perished quickly on exposure. Often from twenty to twenty-five of them were seen in less than a single drop of intestinal mucus. Professor Malmsten makes reference to Leeuwenhoek, who appears to have seen three varieties of animalcules in the mucus of the human intestinal canal. Otherwise, he is aware of no similar previous instances, but considers that, two having occurred to him, their apparent rarity must be only because they have been little sought for, and because they die so soon after expulsion. From their resemblance to the genus *Paramæcium*, some of the species of which are said to be marvellously abundant in stagnant waters, and from their inhabiting the large intestine, Professor Malmsten has named his discovery the *Paramæcium coli*. No one can question that an interest arises here, with regard to the drinking of water containing animalcules, which possibly may yet become still more earnest in our city. At all events, those who speak loudly of the excellences of a lake water, from a few years' experience of a single city with a heavy mortality, can have no right to argue to the contrary, because only two instances of this description have as yet been recorded.

It might have saved some trouble to the recent searchers after fleas in the St Mary's Loch water, had they turned instead to Dr Baird's excellent work on the Entomostraca, where they would have found (p. 84) that their numbers decrease towards February, and about that time they seem to disappear, and perhaps in a severe winter they perish earlier; while in a mild season (which the last was not), they may be found all the winter through, and may exist in great abundance even in the beginning of March. Like many others of the insect race, there are certain years in which they occur in inordinate swarms; and Dr Baird has seen them so abundant as to discolour the water. Our advocates for a lake water will not quote the description of them, transferred to the collected letters of "A Physician" (p. 39,) from an American source, as they have occurred in Lake Cochituate supplying the city of Boston.—I am, &c.

CHARLES WILSON.

In the report in your to-day's paper of the speech of Mr Rodwell, he is stated to have announced that I was perfectly willing to come

forward as a witness, and support the views set forth in my letters ; and that I would come forward voluntarily. This is quite a mistake. Weeks ago, I declined repeated requests to appear as a witness : and the last time, also weeks ago, that I saw the agent, Mr Brodie, I objected so peremptorily that I told him I would not attend, and could not be forced ; when he said that I could be compelled by a Speaker's warrant, but that he would not call upon me if he could possibly avoid it. This kept me in a kind of suspense, and recently I asked Mr Brodie by letter whether the possible necessity he contemplated had arisen, or was likely to arise, but certainly made no offer, and I received no answer. My chief reason for declining has been, that I had so much of the infirmity of deafness that I should have been an unpleasant witness to others, and an exceedingly uncomfortable one to myself. I am still in no mood to offer a voluntary attendance, though I should be sorry to see the question prejudiced were it considered that any essential help could be afforded by me, and certainly I should not await the extremity of a Speaker's warrant.

C. W.

LETTER IX.

(From the Scotsman of May 12, 1871.)

Edinburgh, May 11, 1871.

SIR,—It seems that the avidity that leaps forward in an instant with a charge may be followed by tardiness enough in the attempt to establish its truth ; though in such an instance, and the occasion being that of an evidence on a matter of serious public interest which it was sought to prejudice, the challenge of wrong and the proof should have been as a single act. Following up in your columns my first letter of the 2d May, I again demanded, so long ago as the 6th May, to be informed definitely by Dr Maclagan what were the alleged original sentences—the “simple” sentences—in the French that he had found to be so mistranslated that he could not understand the performance to have emanated from me ; and I desired then to be apprised by him in what respect they had been mistranslated, and how he held that they ought to have been translated.

This demand, so just in itself in reply to such an accusation, has yet received no categorical answer. On the contrary, I find him, in a brief note on the 8th May, no further advanced than the expression of a hope that he will be able to show, within the next twenty-four hours, that he is both unable and unwilling to answer : and I must admit that he has approached towards no small portion of success in this, in the communication which he has furnished to your columns of this morning. In any other than a critic of forms of expression so exigent and decisive as Dr Maclagan has seemed

desirous to prove himself, one might have suspected here some inadvertency or error ; but this, of course, ought not to be imputed to him. It is at least consistent here, that I find his letter in your paper of to-day entirely filled, not with any compliance with my request as definite as it should have been prompt, but, if its drift be comprehensible at all, with an attempt to elicit information and admissions from me, regarding matters that ought to have been thoroughly and convincingly in his own possession before he adventured his charge. He says that I ask him for the sentences on which I founded my ideas. No. I asked for the precise locality of those sentences in the original, alleged by him to have been mistranslated, and which, therefore, he must have previously ascertained and known ; as well as his notion of the manner in which they ought to have been translated, that I might examine whether the mistakes indicated were his or mine. If I have at last got the sentences themselves specified according to a fashion, it is only after the lapse of nine days ; while his conception of what should be the proper translation of them is tarried for still.

It seems, then, that out of the forty-four pages of the collected letters of "A Physician," containing considerably above 2000 lines and 20,000 words, Dr Maclagan has had the remarkable success of being able to persuade himself that he has actually discovered, at page 8, no less than about 3 lines, including 39 words, which he maintains to convey some mistranslation, misinterpretation, or misrepresentation (for he grows suddenly fastidious about the expression) of the meaning intended to be conveyed by two authors, Tardieu and Hugueny ; the former of whom, however, is adequately and convincingly represented besides, in the report to the Academy of Medicine of Paris of the Commission on the subject of water supply of which he was a member, and to which attention was drawn by me immediately afterwards. Is it not sad that, on such a disproportionately narrow frivolity as this, a reputation should be assailed, where it had present no very vigorous defenders ; and what was infinitely worse, a question of public health imperilled, through its investigation being thus led aside from its main and proper issues ? And yet it is on such slender grounds that, with a decisiveness in accurate proportion with the kind of sagacity that must have prompted it, and with a comprehensiveness fitted to the occasion, he bounds at once to an accusation that is to place my French scholarship, not only far beneath his own, but even at the feet of a school miss who can translate "Chambaud's Fables" (what new La Fontaine is this ?) with the aid of a dictionary. If this be so, I suppose there can be nothing else for it but submission ; when possibly my young preceptress may graciously condescend to give so intense a booby a few lessons in the English alphabet also, for that will probably be the next step in the path of descent contemplated for me.

And it is to this degradation, if again I do not err in my interpretation of Dr Maclagan's letters, the tenor of which I confess to be still harder for me to understand than the French that is set down

as my bugbear, that it seems I am expected to contribute by certain admissions of my own. But here I must be excused if, in my simplicity, I do not see the necessity, or even the propriety, of lending any help to Dr Maclagan, in the task which he has assumed entirely and gratuitously for himself, and through his performance of which he has dragged me so lustily into that arena where he must himself complete it. And yet thus far I will give him an aid, to which the manner and occasion of his attack afford him no title, by informing him that the passage in Tardieu on which I found is a single passage; and that I neither amalgamated it nor compared it with any other, whether in its nearer or remoter contiguity, simply because it forms part of the sole paragraph in which the qualities of the carbonate of lime are directly discussed. If, then, he hold the passages he at last cites to be the passages he has averred to be mistranslated, or in some other way travestied, he must begin by transcribing first accurately that from Tardieu, commencing at the middle of page 5, of volume 2, of edition 2 of his "Dictionnaire d'Hygiène," at the words "La plupart des auteurs pensent," and continuing it down to the words which close the paragraph. In this passage, which I require in full, because the whole context is needed to convey a just sense of the author's meaning to the school miss, and, in my now becoming sequence to her, possibly to myself, Dr Maclagan must note carefully the alternate way in which Tardieu uses the terms bicarbonate and carbonate for the calcareous salt, for it seems that I do not employ the designation to Dr Maclagan's satisfaction, and the school miss may prove equally fastidious. Neither must he hesitate at the closing words of the paragraph regarding "la petite proportion de chaux que contiennent ces eaux," and which, it is said, "peut utilement concourir à la nutrition des jeunes enfants en fournissant à leurs os un élément indispensable;" although the idea of an interruption of the growth of the young children's bones, and of consequent rickets, may again rise here before him like a phantom. He will then proceed to his translation of the passage, when the school miss, not, however, without my participation, will refer to the exposition of the meaning in especially the first clause of it, and compare the performance with mine. In the same way, and on the same grounds, if he have the like conviction regarding the identity of the passage in relation to Hugueny, he will turn to a little above the middle of page 238, of the 26th volume of the second series of the "Annales d'Hygiène," and transcribe from the words "Dans le cour de ce travail," down to "l'origine de quelques maladies:" for I consider that the study of the context here, with the completion of its translation, may be necessary for the suggestion of the train of thought that may justify to the school miss that softening of the term "besoin," *necessity*, into "*chief value*," which I have adopted; with the propriety of the application of either term to "la période d'accroissement."

Lastly, let me venture to hint to Dr Maclagan, that there can be no necessity for sneering at Hugueny, or the "good many others" mentioned in the letters, as of no great authority. To rail is but a

graceless office : and the more kindly reviewer in the French periodical designates his countryman as "le savant professeur," whose work may be "lu et étudié avec fruit ;" nor have I quoted any others who ought not to be equally honourably and justly designated. Dr Mac-lagan further observes that, in my examination in London, I profess to adhere to the accuracy of my translations only "as far as possible," while he is to adhere to his evidence, the force and the applicability of which, however, is yet to be shown, "out and out." So censoriously accurate a man should have noted that the phrase of your reporter was "as far as it is possible to do;" by which I have no doubt he intended to express, what was really my meaning, that I adhered to them without stint, and without equivocation. I had the requisite extracts in my pocket, and was ready to proceed with them if required. The counsel could properly claim them, as they had not avouched that they already possessed them.

Before concluding, I must warn the school miss that a verdict of mistranslation I cannot accept, even at her hands. I have been too long familiar with the study of French, from the old language of the Sire de Joinville, Froissart, and Rabelais, down to that of its masters in the present day, to be entitled to the privilege of so lenient a decision. The truth is that my more intimate friends know that, in ordinary reading, I never translate French at all, but take the meaning of the words at once as they present themselves in the original. As for a dictionary, I use that with about the same rarity as in reading English ; and then usually when I encounter one of the rarer archaisms, or a neologism which I may consider of somewhat doubtful pretensions. My kind of dictionary also is invariably that used by the natives themselves, in which I seek a definition and not a mere verbal equivalent. But this is not meant to deter the school miss from her functions. It is only said to show that her verdict, under such conditions, must be one either of acquittal or of misrepresentation.

And thus the matter creeps at last to something like a bearing. I shall now await the transcript and translation of the passages, and shall then expect to learn the decision of the school miss ; though by no means intending to admit my own ultimate assent to her verdict to be unnecessary and superfluous.—I am, &c.

CHARLES WILSON.

LETTER X.

(*From the Scotsman of May 16, 1871.*)

Edinburgh, May 15, 1871.

SIR,—The real merits of this question, between myself and Dr Mac-lagan, must not be allowed to be lost beneath a cloud of circumlocutions and sophistries.

In his evidence before the Parliamentary Committee, Dr Mac-lagan declared upon oath that, when he had looked at the quotations from French authors in the letters of "A Physician," he had found sentences of them mistranslated. Against this I instantly reclaimed in your paper of the 2d of May. In Dr Mac-lagan's replies of the 3d and 4th of May, embodied since in his communication in your paper of May 11, he does not himself specify the original sentences, which he ought to have ascertained before condemning the translation of them, but requires me to point out the passage or passages whence I extract "the very extraordinary statement ascribed to Tardieu," that "most writers hold the presence of one part of carbonate of lime in two thousand of water as advantageous;" with the passage or passages from which I make out that Hugueny "sets the chief value on the existence of lime in waters from its being required in the period of man's growth." And these, amounting together to barely three lines, constitute the whole of the charges, at that time still unattempted to be proved, that are brought against a pamphlet of upwards of two thousand lines, teeming everywhere with references.

That Dr Mac-lagan was still himself in the dark as to the precise passage in Tardieu, the rendering of which he had thus recklessly denounced, is shown in his letter of May 9, when he states that carbonate of lime is not specified in it, though I had given that designation. Nevertheless, he defies me, in the same letter, by any literary alchemy, to extract anywhere the views which I had connected with Tardieu's name. He admits, however, that if I can produce a sentence from Tardieu that shows him to say that "most writers hold the presence of one part of lime in 2000 to be advantageous," I am entitled to an acquittal; but then certain unhappy consequences are to follow to Tardieu, which I by no means think at all necessary to follow, and with which, at all events, I have not the remotest concern.

Knowing well on what grounds I stood myself, I saw all this time my would-be assailant wriggling in the toils, without lending him the aid he so repeatedly asked to extricate him, simply because I thought it but just that he should himself speak his own conviction. Yet my aid was, after all, required, and was vouchsafed at last in my letter in your columns of May 12, when I gave him that information which he ought not to have needed, by indicating the precise paragraph and passage on which my statement was founded, in order that I might put an end to the delay caused by such continuous evasions, and have the result announced before that decision of the Parliamentary Committee which I did not then expect to prove so calamitous for the city. In the immediately preceding paragraph of Tardieu, referred to by Dr Mac-lagan, the writer himself proved that he did not consider that he had hitherto said anything to settle a merely general question, which he had previously propounded, by proceeding now to state that, in order to its solution, it was still necessary to appreciate the influence of a variety

of salts on the quality of waters, and, among these, of the salts of lime. Accordingly, the next paragraph, and that on which I founded, is headed, in *italics*, on the "influence of the salts of lime on the quality of waters;" and here, therefore, and here only, are we entitled to look for the deliberate expression of the views of the author.

Dr Maclagan translates the sentence on which I had immediately based my statement, and which I had thus indicated to him, in the following terms:—"Most authors think that not only the bicarbonate of lime in the proportion of a two-thousandth is not unfavourable, but, further, that it constitutes a useful element of good waters." In my transcription of the meaning of the passage, which is neither presented as a quotation nor as a translation, I drop the antithesis that adds here greater force to the original, and give simply as the import, that it is stated that "*most writers hold the presence of one part of carbonate of lime in two thousand of water as advantageous.*" I do not say that what is "not unfavourable" is necessarily advantageous, for I say nothing of it at all. But I do say that what constitutes "a useful element" in good waters is "advantageous" in them; for useful and advantageous are here merely the plainest of convertible terms, as every English dictionary will testify to anyone who can imagine himself in need of its help. The remainder of the paragraph shows that Tardieu himself believed the carbonate of lime, as he thrice designates it, to be fitted to be useful, and thus advantageous in the way I have described it. The paragraph now referred to is to be found in identical terms in both the editions of the Dict. d'Hygiène of Tardieu: in the first edition, at page 487 of the first volume; and in the second edition, at page 5 of the second volume. The work is in the libraries of the University and of the Royal College of Physicians, and I have for long had a copy of it in my own possession. Before finally leaving Tardieu, I may express my surprise that Dr Maclagan should have considered his statement an extraordinary one. His first edition was published in 1852: and in the very year following, at the Sanitary Congress held at Brussels, and attended by physicians from all parts of Europe, it was decided that the total solids, of whatever description, in water, ought not to exceed thirty-five grains per gallon; which is precisely the limit assigned by Tardieu to the carbonate of lime alone, the least challengeable of all to even the wildest of soft-water fanatics.

As to Hugueny, Dr Maclagan translates that "he has thought he could affirm that, except during the period of growth, man had no need of a water containing lime." Surely that is tantamount to saying, that during the period of growth he had need of it. As the tenor of my remarks, however, required me to transmute into a positive statement, that which he had only introduced as an exceptional or qualifying one, I softened his relational term of an absolute necessity into that of a *chief value*, in the spirit of one who was anxious that the facts and opinions he adduced should not appear overstated; and this certainly should not have appeared a fault to

an opponent. It is not, besides, till the quantity of lime had reached the hardness of 28 deg. to the gallon that Hugueny ventures to designate it as hurtful. I had no right, then, to assume that what only was alleged to become hurtful at 28 degrees, and yet had qualities vigorous enough to prove injurious then, could be utterly inert, and without uses, even as an antacid, at all lower proportions, and at all ages, within or beyond from twenty-seven to thirty years. And let it be observed here, by the way, what Hugueny and his reviewer say of organic matters in water, while keeping in remembrance that we are about to have a water forced upon us charged to discoloration with such matters.

To conclude. I am told that the attempted disparagement of me and of my evidence, as exhibited in the full reports made by the Messrs Gurney for the Parliamentary Committee, is still more virulent and unjustifiable than that of which I have just calmly completed the exposure. I might have seen it, and I was even urged to see it; but I have not seen it, and I do not desire to see it. The bitterness sure to follow on such sayings is best left wholly with those who uttered them. Had the question merely related to my own accuracy, I should have been ashamed to have already written so much; and indeed I am well convinced that it was not needed. But, in the interest of public justice and morality, I ought not to have said less; and I only now regret that I, and others, have not been better able to avert from the city a great calamity, so needlessly and so wantonly inflicted, and by means too often resembling those I have here in the simplest terms made manifest.—I am, &c.

CHARLES WILSON.

LETTER XI.

(From the *Scotsman* of May 27, 1871.)

Edinburgh, May 25, 1871.

SIR,—In a letter which appeared in the *Scotsman* of May 6, attention was called to two cases observed in Sweden of severe, and even fatal, illness, caused by the existence within the human body of a description of animalcules known to naturalists as the *Paramæcium*, or *Balantidium coli*, such as are found to exist habitually associated in stagnant waters with the several kinds of water-fleas; and a variety of details was then furnished relating to what may yet become in Edinburgh a subject of special interest to its now little-considered citizens.

Since the date of the letter referred to, I have had anew forwarded to me from Stockholm the first portion for 1871 of the *Nordiskt Medicinskt Arkiv*, in which I find recorded six additional cases of the occurrence in the human body of the animalcules in question, four of them having been observed in Sweden, and two at Dorpat in Livonia,

making thus eight in all. For the cases observed at Dorpat, I have referred besides to *Virchow's Archiv* (B. xxxvi., p. 285, 1866), where the account of them originally appeared. With the more than doubtful exception of a single example, all of these cases were alike characterised by the presence of severe and protracted diarrhœa; and no permanent cure was effected, the animalcules continuing to show themselves in great numbers under the microscope, so long as the patients remained in the hospital. But, besides this class of cases, on referring back to the fourth portion for 1869 of the same Swedish medical periodical, I find four detailed examples of the occurrence within the human intestines, also giving rise to obstinate diarrhœa, of another kind of animalcule, belonging to the genus *Cercomonas*, examples of which are common inmates of the intestines of the frog. Thus the cases on record of water animalcules transferred to man, and seriously affecting his health and life, are now at least twelve in number: and the aggregate will, doubtless, gradually become enlarged as the attention of observers, still but newly awakened towards them, is more widely aroused; though it is not everywhere that the search and discovery of them, never either an easy or inviting object of pursuit, will find equally watchful and zealous investigators.

When we proceed to consider that this *Paramœcium* or *Balantidium coli*, thus found in man, is found also in the intestines of the water-newt and the frog, and that it has been frequently seen, moreover, in Germany in those of the sow; and when we remember what are the haunts of the former, with the habits of the latter, especially abroad, where the hog ranges through forest, and by pool and lakelet, with a freedom equal to that with which certain of our city Councillors treat the feelings and wishes of their constituents, and with a disregard for cleanly draughts which even a Councillor can scarcely pretend to rival; it seems easy to conclude that newt, frog, sow, and, as the climax, man, derives each this peculiar pest from the stagnant waters which, whether incidentally or habitually, they imbibe, the same waters that teem with the flea producing also usually, in true natural congruity, the animalcules that are at once their associates and their prey. The *Cercomonas*, too, that has been discovered producing identical forms of disease in man, being found frequently in the intestines of the frog, brings with equal force before us the probability of a like common origin in impure water for the higher as for the lower creature. They will be sanguine indeed, then, who can persuade themselves that, should a lake-water so polluted be unhappily forced upon us, and patient observation have thus the opportunity of further studying these facts that are still almost new to science, there will not be found many additional examples among ourselves of this peculiar form of suffering, as a requital for the rashness that has inflicted, and the impotence that has been unable to resist, a hazard so repulsive and yet so needless. We shall then have the experience of a lake-water to teach us the realities. Now we are to be constrained, for we are hardly attempted to be cajoled, into listening to the unabashed assertions of that inexperience which is ever loud in the

proportion that it is empty, yet all the more fitted, on that very account, to mislead those whose more passive ignorance takes the form of credulity.

It is scarcely to be expected that the preceding details will be greatly regarded by the majority of the Town Council, who have ever shown themselves more willing to oppress us blindly, by using against us the taxes we pay ourselves, than to trouble themselves with matters of science, doubtless felt by them to be beyond their competence. As to their impartiality, we may value that in its evidences of a packed Water-Trust, the selection of a chemist, in Dr Frankland, long notorious for his exaggerated advocacy of a soft water, and of an engineer, in Mr Bateman, equally notorious for his having chosen its recommendation as his main pathway to wealth. Surely, this was testing impartiality far too severely. As to defenders of their policy, I have observed none in your columns, which were unquestionably open to them, unless from among their own body, with a few others whom they have paid ; with the result, certainly, that the latter have, in quittance, carried their services to the very uttermost verge of duty, according to the limited sense in which they have necessarily accepted it.

In offering individual instances of the pernicious effects of an impure water, such as are included in this letter, it is by no means my intention that these should be regarded as the sole, or even as the principal, evil results that ensue from it. The far wider, and still more vital, effect of a bad or an uninvigorating and unrefreshing water lies, like that of a vitiated air, in a diminution, to whatever extent, of the general tone of health of the community constrained to its use ; implying thence an increased proneness to suffer from the encroachments of all current diseases, whether epidemic and contagious, or in whatever way originated ; and that beyond, and even far outweighing, what may be deemed the more immediate consequences.—I am, &c.

A PHYSICIAN.

LETTER XII.

(*From the Scotsman of June 12, 1871.*)

Edinburgh, June 10, 1871.

SIR,—A few days ago I had an opportunity of paying a visit to St Mary's Loch, being fortunate in having as my companion a gentleman of scientific education, thoroughly acquainted with the district, of which he is a native. His intelligent man-servant, who accompanied us, was also familiar with all the localities, in height or hollow ; so that in my guides, at least, I had advantages which I could not fail to appreciate highly.

The day was one eminently fitted to display the loch and its water

in their most favourable aspect. A sharp, and even chilly, north-easterly breeze kept the surface in a constant agitation, while a bright sun gave the wavelets all the sheen and transparency that it was possible to impart to them. The temperature of the water, still uninfluenced by the continuous heats of summer and autumn, was only 51° F. at past mid-day, so that it was, at all events, then cool upon the palate, whatever might prove to be its other qualities of agreeableness and sapidity. The streams flowing into it, from the tiniest brooklet up to the main tributary of the Meggat, were undisturbed by recent rains, and, in their swift and shallow courses, seemed pure and translucent. The margin of the loch, which was, where we inspected it, generally formed of a coarse and unrounded gravel, showed the same apparently clear and tintless water, where it was immediately beneath the eye, and spread into a thin stratum.

A closer examination, however, than could be thus casually given to it, was necessary for our object ; though I fear that such merely first impressions, accepted too cursorily, have hitherto influenced many of the ordinary visitors to the loch, who have not the less dared to decide where they have wholly failed to investigate and consider. On looking further into the loch, it was seen that the pebbles, which seemed clean and bleached at the margin, became gradually more and more covered, as the depth increased, with a layer of brownish-yellow flocculi, evidently consisting of the lower vegetable growths, and of deposits of peaty matter. At no great distance from the bank, the bottom became rapidly less distinctly visible, and soon was altogether hid by the superimposed water, impenetrable to the light when in mass, and at depths where the minutest objects would have continued obvious in waters so untinged and transparent as those of the not far distant Tweed and its more important tributaries. We were still near the confluence of the Meggat, which has spread out a considerable delta at its junction with the loch ; and the deposits of peat which were before us, with the discoloration of the water while still in but limited depth and mass, of which we had already the manifest evidence, were efficiently explained by the information of my companions, that the Meggat, when in flood, pours down uniformly a torrent "black as porter," from the many peat-hags on the hills that envelop its channel and its sources.

On proceeding onwards to the house of Mrs Richardson we procured a boat, and entered further into our scrutiny of the loch. Having been provided at Selkirk with a reel and cord, and an extemporized, but perfectly sufficient, dredge, one of our objects was to ascertain the nature of the bottom of the loch at greater depths than it had previously been in our power to examine. The matters which we thus succeeded in bringing to the surface consisted of a darkish-coloured sediment, which, on being placed in a phial, shaken, and then allowed to stand for some time, separated of itself into three very distinct layers. Of these layers, the lowest was constituted by a fine sand, resembling no familiar object more closely than a somewhat minutely ground black pepper ; above this was a thinner layer of a finer material, of brownish-grey colour ; and, above all, was the more watery portion, which, even after the lapse

of days, has remained permanently turbid, and presents a greenish-yellow colour, with faint opaline reflections. On an after examination under the microscope, I found in this sedimentary matter, along with sandy particles, much brown and greenish peaty matter, abundant fibres and fragments of algæ, and several varieties of diatomaceæ; in other words, the usual characteristics of a stagnant water, fed from marshy and peaty sources: and doubtless our proofs to this effect would have been obtained in still stronger accumulation had our dredging been nearer the point of inflow of the Meggat. To test again the colour of the water, a half-sheet of a pure white writing paper was placed within a phial of clear glass, to the neck of which a cord was attached, and allowed to sink below the surface. When submerged only a foot and a-half, the paper, now seen through the tinted medium of the water, presented already a distinct yellow tinge, which increased to a bright gamboge yellow, of striking intensity, at the depth of a yard. No proof could be more decisive to show how thoroughly the water was entitled to the designation of a peaty infusion; and when we give regard to the intensity of the colour, and remember how inadequate are admitted to be the processes of the chemist for even the approximative determination of the quantities of organic matter in a water, it seems to me impossible to doubt that the amount of peaty impregnation in the St Mary's water is much greater than has yet been represented to us by analysis. In submitting it to the trial of taste, we found that, although its degree of coolness at the time seemed to take off in a great measure the impression of its first disagreeableness, there was yet a peaty after-taste, perceptible to all of us, which remained on the tongue afterwards, with to me almost a nauseating unsavouriness, especially if the water were retained for a short interval in contact with the palate. A fourth individual, who had been familiar with the loch from his earliest youth, and to whom we mentioned this impression subsequently, assented at once to its correctness; his own comparison likening the flavour to that of a surface water, which had rested for some time in a grassy hollow. At first, there seemed something strange in the peculiarity of this illustration. Yet, when the combination of an earthy flavour with that of fresh and decaying vegetable matters, which water thus placed must imbibe, suggested itself for consideration, its aptness became too striking to appear accidental.

Such, then, are some of the more obvious conditions and qualities of the water which a few mistaken men, harshly unyielding in their error, are preparing to force as an outrage and an indignity on our queenly city. And if such be its characteristics in the most favourable of its aspects, what will they be under other relations that must test it more severely? Let chemists declaim or assert as they may, if it be supposed, on some sultry day of autumn, when the continuous heats of summer have penetrated the depths of St Mary's, and have rendered its waters dull and vapid in everything save the vivacious insects that the warmth multiplies and fosters, that the philosopher himself should then chance to pass along its margin, and feel the languor of the hour, it is, unless he be conscious of at least a trio of

Provosts on the watch, assuredly not to the tepid and mawkish lake that he will turn for refreshment, until he has first wistfully sought whether there be not some sparkling stream leaping down fresh from the heights, or some living spring bubbling forth at their base, where he may find that elixir which he will seek thence as instinctively and as surely as if his reason had never been warped by the mixed motives and wranglings of a Parliamentary contest. And, not less infallibly and naturally, the peasant, or the humblest wayfarer, who precedes or follows him, will have given, or will follow, the example; for if reason may sometimes swerve or be perverted, instinct, at least, is ever direct and honest. And so it is with the few inhabitants of the near margin of the lake. One farmer, who gave his evidence before the Parliamentary Committee, and who had doubtless closed his eyes firmly against all prospects of a sale of dairy and farm products to an expected host of labourers and their superintendents, stated that his family had been in the habit of drinking the loch water; yet it is, meanwhile, far easier to mark the brook that passes within a few yards of his premises than to discern the, to me invisible, track that led thence to the loch at a more than ten times greater distance. The tenant of a cottage, much closer to the loch, informed us that they never used its water unless when driven to it by their better supply being parched up by summer heats; and I found her statement confirmed by searching vainly for a perceptible track leading from her house to its margin. Every one now knows, what we learned ourselves on inquiry, that the household of Mrs Richardson never uses the loch water, towards which there is here a visible foot-track, for drinking purposes during the warm season; although what they then prefer has to be carried from some distance, after the fashion of what the Water Trustees term "beasts of burden," but which I prefer to consider, knowing what they are thus desirous to escape, as a saving of them from a charge of beastliness.

Exceptions have repeatedly been taken against terming the waters of the lochs stagnant, because they are fed, it is urged, by two principal streams, and evacuated by another. But the perfect justice of this designation is amply proved by certain considerations which I have already detailed elsewhere, but which have not yet appeared in your columns. A water is properly termed stagnant wherever its main body has no perceptible current; and there may thus be stagnant portions even of a river. Let us see, however, in what degree the term is further applicable to the lochs. According to the Statistical Account of the parish of Ettrick, the St Mary's Loch has a depth of from 28 to 30 fathoms, and the much smaller Loch of the Lowes a depth of about 12 fathoms. With these data, it may not be extravagant to estimate the average depth of the whole at only 10 fathoms. Computing with Mr Bateman the superficial extent of the lochs at 725 acres, this average depth of 10 fathoms would give, as their total contents of water, 11,842,875,000 gallons. Now, taking the *outflow*, to be assigned to Selkirk, of 15,000,000 of gallons daily, a quantity which is alleged to be above the average supply in summer which

must ever be the main testing time of the conditions and qualities of the water; and regarding this quantity as necessarily the precise equivalent of the *inflow*, on which alone the freshening power depends; the relation daily of the latter to the gross contents of the lochs is but as 1 to 789: and yet, with this overwhelming proportion of daily unchanged contents, the lochs are denied to contain a stagnant water. But this is not yet enough. Mr Bateman affirms that he can prove that the *outflow*, and, once more, consequently the *inflow*, is often as low as five, four, or even three millions of gallons daily. With five millions of gallons of inflow, then, the proportion of fresh to unchanged water becomes as 1 to 2367; and with three millions it is only 1 to 3945. Possibly, the estimate made here of the mean depth of the loch ought to be abated; but possibly also it ought to be increased. Even if largely abated, it will still leave conclusions more than strong enough to prove all that is requisite. It is accordant with this exceedingly slow mutation, and consequent stagnancy, in the mass of the water, that Mrs Richardson's son informed us that, after the setting in of the colder season, the waters of the loch still continued to retain for long the accumulated heats of the summer. We are justly told, that the cisterns in our houses should be frequently cleansed from the deposit of sediment left in them. But who is to cleanse this cistern of St Mary's, with its multifarious deposits gathered up during the lapse of countless ages, and which we can neither flush out, nor lay bare and remove? The promoters of the bill ask us, with something nearer simplicity than the usual tenor of their proceedings, whether they are likely to be willing to introduce a bad water into their own houses. That question is not for us to decide; but for themselves, and, if they are wise, after a previous consultation with the family doctor. What we object to is that they should force it upon others. If they really desire a water like the St Mary's, and are willing to refrain from coercing us, let them, each for himself, filter slowly through peat our present water, with any additional future supply of kindred quality that may be obtained; and, storing their cisterns with fleas, and the like, from the loch, take care to disturb the sediment by removal as rarely as possible. Through so cheap, and so nearly effectual, a recourse as this, they may at once gratify the peculiarity of their own tastes and abstain from aggrrieving those of others. An abundant supply of fleas, brought back by me from the loch, and which are now in my house, might be at the service of, say, any of the three Provosts, for a commencement.

In my letter in your publication of May 27, I adduced examples of the occurrence within the human body of certain animalcules, known also to exist in some common occupants of stagnant waters, and in the sow that loves to swill and wallow in them; and these were shown, at the same time, to have been productive, when transferred to man, of long-continued, intractable, and even fatal disease. These facts have been of but recent discovery; but their novelty, while naturally augmenting their interest, could add nothing to what is their real importance. The surmise which I had then ventured, that these animal-

cules had been introduced into the human intestines through the drinking of a lake or stagnant water, receives strong confirmation from a treatise now lying before me on the drinking waters of the Scandinavian countries, by Professor Almén, a Swedish physician and chemist, published during the present year in the "Transactions of the Society of Swedish Physicians" at Stockholm, and honoured by that body, of which I rank as a member, with a prize of 2000 dollars. It will be remembered that a large proportion of the cases had been observed at Stockholm, and Professor Almén shows now the character of the Lake Mälär water, with which that city and its vicinity is largely supplied. The water, as repeatedly examined, was of a pale yellow colour; and even with the naked eye there were observable in it a number of lively crustaceæ (fleas) and other small insects. On investigation with the microscope, numerous vivacious animalcules were besides discovered, sometimes as many as eight at once within the field of vision. He discovered also many dead animal and vegetable remains, a quantity of circular cells and spores, and several kinds of algæ and diatomaceæ, besides the abundant fleas, and various kinds of animalcules, already referred to. It was found, and let this be well noted, that these animalcules, with various insect eggs and vegetable spores, could not be removed by what has proved the costly operation of filtration through a depth of several ells (each 2 ft.) of layers of coarser and finer sand; and this explains, the writer adds, why a lake water keeps so much worse than a good spring water. When we thus know, then, that in that country over-abounding in lakes the inhabitants of Stockholm and its vicinity drink the waters of Lake Mälär, that these waters contain numerous animalcules, and that patients gravely molested with like animalcules are found in the city hospital, the connection seems not only easy to be traced, but impossible to be overlooked. In the Dell lake water, partly supplying, or intended to supply, the town of Göteborg, he found also many fleas, with dead animal and vegetable remains, and a variety of animalcules. Such a water, he adds, cannot be regarded as a good drinking water; while that of Lake Venern he describes as of a still worse quality. Copenhagen is supplied with a faintly discoloured water, derived in part from lakes and in part from artesian wells; and here are found also many living organisms visible to the naked eye, while the microscope shows besides abundant animalcules and a variety of diatomaceæ. After filtration, the water was possibly a little less tinted; but here, as at Stockholm, numerous lively animalcules, and many remains of brown algæ, had passed through the filter. Let our Water Trustees consider these various, yet unvarying, accounts of lake waters, and compare them with that given in a former letter of the occasionally disgusting condition of Lake Cochituate, supplying Boston in the United States, and then continue their love for a lake water, if they can, and their determination to thrust it on their constituents, if they dare.

Professor Almén has examined and described eighty different waters, supplying different localities, and he has divided them into four groups, in the order of their estimated relative superiority, of spring, well,

river, and lake waters. "Spring waters," he says, "are the best drinking waters, while the ordinary potable well waters are inferior ; but both are, beyond comparison, much superior to both river and lake waters." To the presence of organic matters, whether vegetable or animal, he attaches great importance as mainly affecting their salubrity ; and here he desires to be especially considered the quantity of the lower vegetable growths and animalcules, their spores and eggs, &c. His views in this respect accord well with the experience of those who have studied the effects of the waters of the jungles of Bengal, the lagoons of Africa, or the marshy tracts of the south of France. He arranges in a table the whole of the 80 waters examined in the order of their excellence. Of 17 spring-waters, having an average hardness of 5.39 per gallon, 13 were good, 2 admissible, and only 2 thoroughly bad. Of 13 lake waters, on the other hand, having an average hardness of 1.96 per gallon, only two were good, 7 were admissible, and 4 were thoroughly bad ; but the very best of his lake waters (Vettern) ranks only as 19th, and another portion of it as 29th, on his list, while his good spring waters hold the very foremost places. Of the other lakes instanced in this letter, the Dell lake water stands 38th on the general scale ; the Copenhagen mixed lake and well water ranks as 48th ; and the Lake Mälär water, at Stockholm, as 58th, the two latter being estimated even after filtration. Such is the low appreciation of soft lake-water by this able writer, who, to his skill as a chemist, joins the right to speak of health and its laws which belongs to him as a physician : and he further remarks that, wherever such a supply has been extravagantly lauded, it has probably been in the interests of water speculators, who, for the wants of cities, could only provide a soft and limeless water.

Such a testimony, proceeding from a country that has produced naturalists like Linnæus, Artdi, Agardh, and Nilson, with chemists like Bergman, Scheele, and Berzelius, and whose men of science are still distinguished for their rare and solid judgment, ought not to fail to receive the highest consideration. In now adducing it, and along with it that of the body of physicians of Sweden, embraced in their Association at Stockholm, who have given to it the sanction of an important prize, and joining it beyond to the previously cited decisions of the Government Commissions of London, Paris, and Vienna, and of the Academy of Medicine of Paris, the question forcibly arises, what probability there can be that so high and so various authorities can be universally in error, and only our Water Trustees, with the scanty scientific support they have been able to muster, can be exceptionally in the right. For my own part, if I trust these, and the many other authorities in whose train I follow, it is not so much because they have won my faith as because they have convinced my judgment. Yet those who have only facts and reasons to offer must know that they are proffering what all do not find alike acceptable or congenial ; and that there are many men who are not thinkers, and who throw themselves open the most readily to mere assertions, that demand from them only assent, and not intelligence. Still, there is pleasure in observing

that some of our city Councillors are now halting in their course, as if their better and kindlier qualities were about to predominate; though as yet they may be wavering but half-way between that meaner courage that maintains a predetermination and the far higher and greater courage that owns an error. Let us hope that we may speedily be able to greet their entire conversion with the honour and welcome it will well deserve.

As for the inexorably unanimous Town Councillors of Leith, if that town be not misrepresented by them, and if it really desire to provide a water that is not acceptable, and never was owned to be acceptable, to the inhabitants of Edinburgh, let it, like Musselburgh, seek a water bill of its own. Usually, and on all other matters that arise, it has had no difficulty in regarding its interests as separate from ours.—I am, &c.

A PHYSICIAN.

